REMARKS

Claim status

Claims 1-70 were pending in the case at the time of the current Office Action. Claims 11-38 and 47-70 have previously been withdrawn. Claim 1 is currently amended herein. Claims 1-70 are currently pending in the application.

Section 103 rejections

In the current Office action, claims 1, 2 and 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujita et al. (U.S. Patent 5,825,336), hereinafter Fujita, in view of Lipkin (U.S. Patent 5,999,944), hereinafter Lipkin.

Applicants respectfully traverse the foregoing rejection in view of the above pending claims and for reasons set forth hereafter.

To allow an easier understanding of the claim structure, various parts of claim 1, as recited below, have been numerically annotated. The numerical annotations are referred to herein in the arguments below.

Independent claim 1 recites:

An apparatus for image data computation and for synchronous image data output, comprising:

(1) at least one signal input which is connectable to an external input unit;

(2) a first message channel;

(3) a graphics master unit

(3-1) which has a first random access memory

(3-1-1) adapted to receive a first scene graphics data file
which defines objects and/or events
which can be illustrated in an image
and associates object and event parameter values respectively with the objects and/or events,

(3-2) is connected to the signal input,

(3-3) is connected by way of a first message interface for incoming and outgoing messages to the first message channel

(3-4) and which is adapted

(3-4-1) to re-compute and store the object and/or event parameter values of the first scene graphics data file in dependence on the current object and/or event parameter values thereof and on the current state of the signal input

(3-4-2) and to produce and send a first message by way of the first message interface, wherein the first message contains at least a part of the freshly computed object and/or event parameter values; and

(4) at least two graphics client units, wherein each graphics client unit

(4-1) has a respective second random access memory which is adapted to receive a second scene graphics data file,

(4-2) is connected by way of a second message interface for incoming and outgoing messages to the first message channel,

(4-3) has an image data output,

(4-4) and is adapted

(4-4-1) to receive current object and/or event parameter values by way of the second message interface and to store the received object and/or event parameter values in the second scene graphics data file,

(4-4-2) to compute image data of an image in dependence on current object and/or event parameter values of the second scene graphics data file,

(4-4-3) to produce and send a second message to the graphics master unit by way of the second message interface which signals the conclusion of the image data computation of the image,

(4-4-4) and to output the image data at the image data output.

Claim 1 has been amended herein for the following reasons. The previous claim 1 listed an external input unit as being part of the claimed apparatus. However, including the external input unit into the claimed apparatus introduces an unnecessary limitation of the scope of protection. Therefore, claim 1 has been amended to read, "at least one signal input which is connectable to an external input unit". Also, in element (3-4-1) of claim 1, it should be clarified that the graphics master unit is adapted to re-compute the first scene graphics data file not only in dependence on current object parameter values, but also in dependence on the current state of signal input. Therefore, the word "on" has been included in the wording of claim 1 to improve the readability of this feature.

On page 3 of the current Office action, the Examiner seems to indicate that feature (3-4-1) of claim 1 is disclosed by Fujita in the master terminal of Fujita converting display position data and video data for correcting display characteristics on a slave terminal. However, this operation has nothing to do with re-computing object and/or event parameter values of the first scene graphics data file in dependence on the current object and/or event parameter values thereof and on the current state of the signal input.

First, the master display terminal of Fujita does not re-compute object and/or event parameter values of the first scene graphics data file. Instead, Fujita computes operational data for the slave display terminal. According to columns 6 and 7, lines 64-6 of Fujita, the operational data are generated from an input signal received from the user through a keyboard or mouse. The master display terminal thus does not rely on a first scene graphics data file stored in its first random access memory when generating the operational data.

Second, even if one would want to call the operational data of Fujita as being equivalent with the object and/or event parameter values of claim 1 (which would be a misinterpretation), there is no disclosure in Fujita of re-computing currently existing object/event parameter values in dependence on both the current object/event parameter values and on the current state of the signal input. Rather, the master display terminal of Fujita only relies on input signals from the keyboard or the mouse.

Furthermore, Fujita does not disclose storing the re-computed object/event parameter values.

Therefore, there is no "re-computing" and no access of the first scene graphics data file, which is necessary according to claim 1 to obtain and store the re-computed object/event parameter values.

As a result, it is respectfully submitted that the Examiner's interpretation that the data transmitted from the master terminal to the slave terminal (column 7, lines 7-10 of Fujita) are functionally equivalent to the first message of features (3-4-2) of claim 1 is not correct. The first message according to claim 1 of the present application is defined by the freshly computed object/event parameter values contained therein. Fujita describes a message that contains different parameters. Therefore, the master terminal cannot be "functionally equivalent" at this point to an extent that is sufficient for denying the novelty of feature (3-4-2) of claim 1.

The Examiner seems to indicate that feature (4-4-1) of claim 1 is disclosed in Fujita by forwarding received operational data in the display slave terminals to a task control portion, executing a "task" upon the data and then passing the task-executed data to a display portion for display output. Here again, it should be pointed out that the received data in the slave display terminals are different in nature form object/event parameter values of a scene graphics data file. Furthermore, Fujita does not disclose storing the received object/event parameter values in a second scene graphics data file stored in the respective second random access memories of the graphics client units.

The Examiner might think that, since a RAM is provided in the slave display terminals of Fujita, some sort of storage would "inherently" take place. However, Applicants point out in advance that such argumentation is not valid. In claim 1 of the present application, storage refers to the generation and modification of a respective data file in the random access memory. A data file is a well defined structure. In contrast, Fujita does not describe operations in the slave display terminal that act upon a stored scene graphics data file. Instead, the received data are forwarded to a task that is provided in the slave display terminal and immediately used for executing the task, which seems to influence the displayed image of the slave display terminal

(see column 7, lines 17-37 of Fujita). In this operation, no storage of received object/event parameter values in a (persistent) second scene graphics data file is inherently required.

On page 4 of the current Office action, the Examiner seems to interpret the retransmission of task-executed-upon-data from the slave display terminal to the master display terminal as comprising some sort of completion signal to end communication. The Examiner states that such a signal would be inherent to the communications networks and protocols implemented by Fujita.

In the Examiner's response to the Applicants' arguments of the previous Office action (i.e., in section 8 on page 14 of the present Office action), the Examiner further states that, since master and slave terminals are interfaced through a network communication interface, exchanging of data through networks would be inherently synchronized using certain protocols like TCP, UDP, FTP, etc.

At this point, the Examiner seems to overlook the well-defined content of the message that is sent from the graphics client units to the graphics master unit. The message indicates "<u>the conclusion of the image data computation of the image</u>". This is not "some sort of completion signal to end communication" as the Examiner states it on page 4 of the current Office action. A completion signal to end communication refers to the task of data transmission between a slave display terminal and a master display terminal in Fujita, not to the task of image calculation.

In this context, precise observance of the used wording is also of importance for the correct interpretation of the technical teaching of claim 1. Claim 1 defines <u>messages</u>, whereas transport-layer protocols handle data packets, irrespective of the meaning of the messages, which are transported by the data packets. The meaning of the message, as defined in claim 1, can only be interpreted on the application layer, i.e., by the graphics master unit.

More specifically, in terms of communication technology, data transmission protocols are not referred to in claim 1. Instead, the message that is transmitted from a graphics client unit to the graphics master unit and that indicates the conclusion of the image data computation of the image is an application-layer message.

A signal referred to by the Examiner, however, may be defined on the network layer or the transport layer according to the OSI reference model. The Examiner indeed gives examples of transport-layer protocols (TCP, UDP), which is an evident proof of the Examiner's misinterpretation of the message defined by claim 1 of the present application.

It is respectfully submitted that, clearly, the Examiner is incorrect in his reasoning that an exchange of data through a network involving a signal indicating an end of communication, be it inherent in certain protocols on the network and transport layer or not, would be able to receive the synchronization according to the method of claim 1. The synchronization according to claim 1 is based on an application-layer message sent from the graphics client units to the graphics master unit.

Hypothetically, if a transport-layer protocol signal indicating an end of communication were the only signal transmitted from the graphics client units to the graphics master unit, the graphics master unit would not be able to interpret this as indicating the conclusion of the image data computation of the image at the respective graphics client unit. Instead, in such a situation, the graphics master unit would continue to wait, resulting in an operational failure of the apparatus.

Furthermore, it is respectfully submitted that the combination of Fujita and Lipkin does not render obvious the subject matter of claim 1.

Unlike Fujita, Lipkin describes a system that belongs to the same general field of technology as the subject matter of the present application. Lipkin is concerned with a method and apparatus for implementing dynamic VRML. VRML (Virtual Reality Modeling Language) is a standard file format for representing three-dimensional interactive vector graphics. Lipkin describes that, based on the previous knowledge, there was a need for rapid and efficient (specifically, real-time) creation, modification, and updating of a virtual world, especially with a system or process that permits elements of a graphical world to be modified in real time based upon a changing source of data.

The solution provided by Lipkin is based upon the use of a data base for storing field values of a node (i.e., an object of the virtual world). VRML is designed particularly for use

with the world wide web. Accordingly, the system described in Fig. 1 and relied upon by the Examiner comprises a server and a client, which are connected over a network 18. The server 10 is described as a web server containing a VRML agent 16. The server has access to a VRML data base 20, which is accessed by a data base server comprised by web server 10 and containing the VRML agent 16 (see column 6, line 40 to column 7, line 44 of Lipkin).

Again, it is respectfully submitted that the combination of Fujita and Lipkin does not render obvious the subject matter of claim 1. The Examiner seems to rely on an incorrect understanding of the technical effect achieved with the apparatus of claim 1.

The apparatus of claim 1 provides a sharing of the computation load during image calculation, and not a display of the same virtual world data on each connected computer, as suggested by the Examiner's statement of page 5, first paragraph, of the current Office action. Sharing the computational load is achieved by having the graphics master unit re-compute a first scene graphics data file in dependence on the current status of the first scene graphics data file and on the current state of the signal input, and transmitting a first message to the graphics client units with updated object/event parameter values that let the graphics client units update their individual second scene graphics data file for computing image data.

This concept renders any re-transmission of the computed image data back to the graphics master unit oblivious. It should thus be clear that the apparatus of claim 1 is not related to remote control, as the Examiner states again in his argumentation on page 5, first paragraph. The concept of remote control is completely foreign to the claimed invention.

Fujita thus refers to a totally different master-client relationship. The master of Fujita needs image data from the clients in order to be able to perform its control operation. In contrast, the graphics master unit of claim 1 does not rely at all on any image data from the graphics client units for its operation. The operation of the graphics master unit is based on the current state of the first scene graphics data file and on the current state of the signal input, as defined by element (3-4-1) of claim 1.

Therefore, while the description of Fujita involves and requires a transmission of video data from a slave display terminal to the master terminal for correct operation, the apparatus of

claim 1 only transmits the second message indicating the conclusion of the image data computation of the image from the graphics client units to the graphics master unit, which allows achieving a synchronization between the graphics master and all connected graphics clients.

Combining the teachings of Fujita and Lipkin would not lead to the distributed computing of image data involving a graphics master and at least two graphics clients. In fact, Lipkin seems to teach away from claim 1 of the present application.

First, the system of Lipkin has only one client, not "at least two clients", as does claim 1. Thus, Lipkin does not disclose a distribution of image data calculation load onto the shoulders of a plurality of clients. Instead, Lipkin describes a server-client relationship and implies that the server provides the complete parameter set, which the client needs for performing an image calculation. The calculation of the image is performed at the client alone, which client thus carries the full computational load. The server-client relationship described by Lipkin, therefore, does not involve a sharing of the computational load between a master and a plurality of clients.

Even if not directly disclosed by Lipkin, the teaching of Lipkin would not exclude that another client can be connected to the server. That would form a situation comparable to that of well-known internet use, where a web server can serve a number of clients (i.e., computers with web browsers running), using some multiple access administration scheme on the server side. However, these individual server-client relationships would all be independent from each other and not involve a sharing of a computational load.

Therefore, Lipkin seems to teach away from the apparatus of claim 1.

Note that Fujita does directly disclose the possibility of having more than one slave terminal coupled to the master display terminal. However, in the system of Fujita, the master display terminal controls each slave display terminal individually, in the sense of having a plurality of master-client relationships being operational in parallel and independent from each other on the master display unit. In that sense, the teachings of Fujita and Lipkin resemble each other.

This difference in the master/server-client relationship becomes clearer when considering a hypothetical addition of one client to the respective systems. In Fujita, the master display

terminal would have an increased computational load if the number of slave display terminals was increased by one because this would involve additional image data calculations for controlling the respective additional slave display terminal. In contrast, according to claim 1, the computational load of the graphics master unit does not increase with an additional graphics client unit because the apparatus of claim 1 involves a sharing of parameters of <u>one and the same</u> first scene graphics data file between the graphics master unit and all graphics client units. The graphics master thus always has the same computational load in image calculation, namely, the calculation of the first scene graphics data file.

To avoid any misunderstandings, it should be pointed out that this does not mean that all graphics client units receive the same parameters. Rather, they eaeh receive respective object/event parameters taken from the same first scene graphics data file.

Furthermore, the mere fact that Lipkin is related to the calculation of a virtual world would not allow a person of ordinary skill in the art to arrive at the apparatus of claim 1 using the additional teaching of Fujita. Implementing the teaching of Fujita would require the skilled person to provide for a transmission of image data from the VRML client back to the VRML server in Lipkin's system. This, however, is not part of the claimed apparatus. Only the second message indicating completion of the image calculation is transmitted from the graphics clients to the graphics master.

Therefore, in view of at least the foregoing, it is respectfully submitted that independent claim 1 is not unpatentable over Fujita in view of Lipkin, and it is respectfully submitted that independent claim 1 defines allowable subject matter. Also, since claims 2 and 42-44 depend either directly or indirectly from claim 1 it is respectfully submitted that claims 2 and 42-44 define allowable subject matter as well. Applicants respectfully request that the rejection of claim 1, 2 and 42-44 under 35 U.S.C. 103(a) be removed.

Also, in the current Office action, claims 3, 4, 39, 40, 45, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujita, Lipkin, and further in view of Ishiwata et al. (U.S. Patent 5,894,312), hereinafter, Ishiwata.

Applicants respectfully traverse the foregoing rejections in view of the above pending claims and for reasons set forth hereafter.

As described previously, Fujita and Lipkin do not teach or suggest the invention of independent claim 1 and it was submitted that claim 1 defines allowable subject matter. Therefore, the use of multiple memory addressing techniques as described by Ishiwata, in combination with Fujita and Liplin does not teach or suggest the invention of claims 3 and 39 which are dependent, either directly or indirectly, on claim 1. Similarly, the use of a control section as described by Ishiwata, in combination with Fujita and Lipkin does not teach or suggest the invention of claims 4 and 40 which are dependent, either directly or indirectly, on claim 1. Also, the use of an image processing apparatus and a control section as described by Ishiwata, in combination with Fujita and Lipkin does not teach or suggest the invention of claim 45 which is dependent, either directly or indirectly, on claim 1. Finally, the use of a control section and data selectors as deseribed by Ishiwata, in combination with Fujita and Lipkin does not teach or suggest the invention of claim 45 which is dependent, either directly or indirectly, on claim 1.

Since claims 3, 4, 39, 40, 45, and 46 depend either directly or indirectly from claim 1, it is respectfully submitted that claims 3, 4, 39, 40, 45, and 46 define allowable subject matter as well. Applicants respectfully request that the rejection of claims 3, 4, 39, 40, 45, and 46 under 35 U.S.C. 103(a) be removed.

Further, in the current Office action, claims 5-10 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujita, Lipkin, Ishawata, and further in view of Matsumoto et al. (U.S. Patent 5,666,544), hereinafter, Matsumoto.

Applicants respectfully traverse the foregoing rejections in view of the above pending claims and for reasons set forth hereafter.

As described previously, Fujita and Lipkin do not teach or suggest the invention of independent claim 1 and it was submitted that claim 1 defines allowable subject matter. Therefore, the use of data handshaking methods as described by Matsumoto and multiple memory addressing techniqucs as described by Ishiwata, in combination with Fujita and Lipkin,

does not teach or suggest the invention of claims 5 and 41 which are dependent, either directly or indirectly, on claim 1. Similarly, the combination of Fujita, Lipkin, Ishiwata, and Matsumoto does not teach or suggest the invention of claims 6-10 which are dependent, either directly or indirectly, on claim 1.

Since claims 5-10 and 41 depend either directly or indirectly from claim 1, it is respectfully submitted that claims 5-10 and 41 define allowable subject matter as well. Applicants respectfully request that the rejection of claims 5-10 and 41 U.S.C. 103(a) be removed.

Accordingly, the applicant respectfully requests reconsideration of the rejections and objections based on at least the foregoing. After such reconsideration, it is urged that allowance of claims 1-10 and 39-46 will be in order.

Respectfully submitted,

Date: 9-27-06

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